

Claims.

1. A micro electromechanical system switch including a fixed contact (24, 42) and a moveable contact (35) on an armature (30)

characterised by:

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electrodes (22, 34) associated with both the fixed and moveable contacts for providing an electrostatic switch operation;

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piezoelectric material (37) with associated electrodes (36, 40) for bending the armature (30) upon application of electric voltages and providing a piezoelectric switch operation;

the armature being of curved shape which is bent away from the fixed contact (24) when in a switch open condition with zero applied voltage;

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the arrangement being such that operation of the piezoelectric material (37) bends the armature towards the fixed contact (24) and bends the moveable contact (35) into a substantially parallel alignment with the fixed electrode for clamping of the fixed and movable contacts under electrostatic force from the electrostatic electrode (22, 34).

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2. The switch of claim 1 wherein the fixed contact are transmission line contacts and the moveable contact is a switch contact for switching parts of a microwave system.

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3. The switch of claim 2 wherein the moveable contact is a switch contact with at least two protuberances for connecting two electrically isolated parts of a signal line together.

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4. A method of providing a micro electromechanical system switch having a movable armature (30) mounted on and separated from a substrate (21), the method including the steps of:
- 5 providing a substrate (21) carrying a fixed metal layer forming a fixed contact (24), electrostatic switch actuation electrodes (22) and electrical interconnects (25, 26);
- 10 providing an armature having a mechanical layer (38) carrying at least one movable switch contact (35) for electrical switching, an electrode (34) electrostatic actuation, and carrying a layer of piezoelectric material (37) between two electrodes (36, 40),
- the layers comprising the switch having variable in-plane stress and/or stress gradient across their thickness for causing the armature in its free state to adopt a curved
- 15 condition bending away from the substrate;
- the arrangement being such that operation of the piezoelectric material (37) bends the armature (30) towards the substrate (20) and bends the moveable electrostatic actuation electrode (34) into a substantially parallel alignment with the fixed
- 20 electrostatic electrode (22) for clamping of the moveable switch contact (35) to the fixed switch contact (24) under electrostatic force.
5. The method of claim 1 wherein the fixed metal layer forms a part of a coplanar waveguide transmission line and the fixed contact is a part of this transmission line.
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